REMARKS/ARGUMENTS

Drawings

Two sheets of corrected drawings are submitted herewith. Fig. 3 is amended to change the reference numeral of O-ring "50" to -- 49 -- and Fig. 7 is amended to delete reference numerals 34 and 180. Annotated marked-up sheets are also enclosed.

Claim 1

Claim 1 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Murray et al. (U.S. 2004/0051048) in view of Hurst et al. (U.S. 4,471,223). This rejection is respectfully traversed.

Murray et al. disclose a system for detecting neutron radiation using a liquid scintillation material. As stated in paragraph 2, there are only two terrestrial sources of neutrons: (1) particle accelerators; and (2) fissile materials. Fissile materials form a threat if used by a terrorist to construct either a nuclear weapon or "dirty bomb." Accordingly, Murray et al. do not address constructing a radiation detector for use in combination with a source of gamma radiation as a level sensing gauge. Using a neutron emitting isotope as the source for an industrial level sensing gauge would be inappropriate because it is both unnecessarily dangerous and expensive. Accordingly, a person of ordinary skill in the art would not be led by the highly schematic disclosure of Murray et al. modify it for such use. Instead constructing such a highly modified apparatus would only be guided by hindsight use of the presently-claimed invention as a road map.

Hurst et al. disclose a level sensing gauge that uses a source of nuclear (gamma) radiation but one in which the situation requires that the electronics of the device must be located 50 to

100 meters away from a series of scintillators. Hurst et al. disclose optically connecting the electronic photomultiplier tube to the rigid, solid cesium iodide crystal scintillators by using a optical fiber cable covered by a protective sheet as a light pipe. Contrary to the Examiner's puzzling statement, neither Murray et al., Hurst et al., nor the present invention use scintillating fiber optics as a detector. In Hurst et al., optical fibers are used merely as an extended light guide. Hurst et al. does not discuss flexibility being a feature or quality of any of its components, although to the extent that the Hurst et al. detector may allow flexibility, it would be limited to the optical fiber light guide and would not be found in the rigid steel-encased, cesium iodide crystal scintillators.

Although there is no motivation within their disclosures to combine theses structures, if the structures of Murray et al. and Hurst et al. were combined, the result would be a liquid scintillation neutron detector in which the scintillator was located remotely from the photomultiplier tube and other electronics and in which the two parts were connected by a fiber optic light guide covered with a protected sheath. The remote positioning of the electronics from the neutron detection scintillator would be unnecessary for the invention disclosed in Murray et al. Likewise, the neutron detection scintillator would be wholly inappropriate for use as a level sensing gauge. To substitute the cesium iodide crystal scintillator disclosed in Hurst et al. for the neutron detection liquid scintillation material in Murray et al. would make the hybrid inoperable for either of the inventions' disclosed uses.

As shown in Figs. 1 and 2 of Hurst et al., the protective sheath 7 covers only the optical fibers 6 and not the rigid steel case 11 disclosed to protect the rigid (and fragile) cesium iodide crystal scintillators 10. Likewise, encasing the neutron detecting liquid scintillator of Murray et al. in the rigid steel case 11 disclosed by Hurst et al. would be both unnecessary for the purpose

disclosed by Murray et al. and would defeat the potential of flexibility in an elogated liquid neutron detection scintillator. Quite simply, because the device disclosed in Murray et al. has no need for remotely separating its scintillator from the photomultiplier tube and other electronics, there would be no motivation to combine the optical fiber light guide encased in a protective sheath disclosed in Hurst et al. with it. For the same reason, there would be no motivation or purpose for combining the neutron detection liquid scintillator of Murray et al. into the level sensing device of Hurst et al. The prior art lacks any suggestion or motivation for making such a combination and the resulting combination would not be functional for the purpose of either of the prior art inventions nor would it create a structure meeting each of the limitations of Claim 1. The combination would cease to be useful as a radiation type level sensing gauge and would not provide a flexible protective sheath around a liquid filled scintillator tube.

To combine the structures disclosed in Murray et al. and Hurst et al., and then to modify the resulting combination in a way that would transform it into the presently-claimed invention, one of ordinary skill in the art would have to look beyond the teachings of the cited references and use the present disclosure as a guiding "road map." Such a hindsight reconstruction is not a permissible basis for an obviousness rejection. *See Ex parte Gould*, 6 USPQ2d 1680 (PTO Bd. Appls. 1987); *Ex parte Chicago Rawhide Mfg. Co.*, 223 USPQ 351 (PTO Bd. Appls. 1984); *In re Sernaker*, 217 USPQ 1, 4 (Fed. Cir. 1983). Accordingly, claim 1 is patentably distinct over the cited prior art.

Claims 2 and 7

Claims 2 and 7, which depend from Claim 1, stand rejected under 35 U.S.C. 103(a) as being obvious over the combination of Murray et al. and Hurst et al. in view of Wojcik et al. (U.S. 5,856,946). This rejection is respectfully traversed.

The Examiner states that Murray et al. (as well as Hurst et al.) lacks an expansion chamber for accommodating volumetric expansion of the liquid scintillation material. Wojcik et al. discloses a liquid-core light guide designed to accommodate temperature-induced volumetric variations. As discussed above, a combination of Murray et al. and Hurst et al. is neither motivated by the prior art nor does it produce an operable combination. The addition of Wojcik et al. does not cure either of these defects.

Nothing in Wojcik et al. provides a motivation for combining parts of any of these three references together. Additionally, if such a combination were created, the logical result would be to substitute the liquid-core light guide of Wojcik et al. for the optical fiber light guide 6 of Hurst et al. Such a combination would be functional, but would not include the neutron detection liquid scintillation material of Murray et al. Substituting the neutron detection liquid scintillation material of Murray et al. into this combination would cause it to no longer be useful as a level detection gauge. Likewise, there is no motivation provided by the prior art to insert a light guide extension, either of fiber optics or liquid core, into the Murray et al. device in order to space the neutron detection scintillator from its electronic detector components. To the extent that Wojcik et al. discloses the use of a flexible outer sheath (column 4, lines 55-61, and column 6, lines 60-62), it is to provide a flexible bladder 20 as a volumetric expansion chamber covering only a short portion of the light guide. Such a construction would be incompatible with the protective sheath 7 disclosed by Hurst et al. None of the structures disclosed in Wojcik et al. include a movable wall *within* the variable volume expansion chamber as specified in Claim 7.

For these reasons, Claims 2 and 7 are patentably distinct over the prior art.

<u>Claims 3-5, 8, and 9</u>

Claims 3-5, 8, and 9 stand rejected under 35 U.S.C. §103(a) as being obvious over the combination of Murray et al., Hurst et al., and Wojcik et al. as applied to Claims 2 and 7, and further in view of Ilzig et al. (U.S. 4,286,839). This rejection is respectfully traversed.

Ilzig et al. discloses a liquid-filled variable lens that may be adjusted as a function of the pressure applied to the light transmitting liquid within the tube. Ilzig et al. uses variable hydraulic pressure of the internal liquid in order to control the position of lenses or even a light fixture itself (Fig. 2d). Ilzig et al. does nothing to suggest a slidable piston member that is operably positioned within a scintillation chamber to define a variable volume expansion chamber free of liquid scintillation material and adjacent to one end of the liquid-filled scintillator of a radiation type level sensing gauge. Furthermore, it does nothing to overcome the inadequacies of or provide a motivation to combine Murray et al., Hurst et al., or Wojcik et al. Nothing in Ilzig et al. suggests the use of a stiffener to maintain a portion of a flexible scintillation chamber to prevent bending thereof.

In regard to Claim 9, the Examiner notes that Ilzig et al. teach that the piston can be used to position optical components. In this regard, the disclosure of Ilzig teaches away from the presently-claimed invention, rather than suggesting it. This precludes it as a basis for an obviousness rejection of the present claims. *See In re Diminski.*, 230 USPQ 313 (Fed. Cir. 1986) and *In re Gordon et al.*, 221 USPQ 1126 (Fed. Cir. 1984). There is absolutely no support in the prior art for the proposition that it would be obvious to provide a member position to selectively immobilize the movable wall in a fixed position in the otherwise dysfunctional hybrid combination of Murray et al., Hurst et al. and Wojcik et al. Any modifications to make such a combination useful would be based on improper hindsight use of the present specification.

Accordingly, the structures specified in Claims 3-5, 8, and 9 are patentably distinct over the prior art.

Claim 6

Claim 6 stands rejected under 35 U.S.C. §103(a) as being obvious over the combination of Murray et al., Hurst et al., and Wojcik et al., in view of Nath (U.S. 3,995,934). This rejection is respectfully traversed.

Nath discloses a flexible liquid filled light guide having an external liquid supply container (6, 43). Wojcik et al. and Nath appear to disclose mutually exclusive alternatives for compensating for volumetric variations in a liquid filled light guide. The light guide of Hurst et al. is not liquid filled but is optical fibers, for which the inventions of Wojcik et al. and Nath would be of no use. Although there is no motivation to substitute a liquid filled light guide for the optical fibers disclosed in Hurst et al., doing so would not result in a device having a liquid filled scintillator for use as a radiation-type level gauge, as presently claimed. Forcing the structures of Wojcik et al. and/or Nath into the structure of Murray et al. would only create a neutron detector in which a liquid-filled light guide separated the scintillator from the electronic components. As discussed above, there would be no purpose for modifying Murray et al. in this way for its disclosed use as a neutron detector for sensing the presence of terroristic materials.

Alternatively, forcing the apparently mutually exclusive structures of Wojcik et al. and Nath into Hurst et al. would simply result in the substitution of a liquid filled light guide for the optical fibers shown in Hurst et al. If this combination were modified by the teachings of Murray et al. the result would be either 1) a detector for the presence of terrorists' fissile materials in which the neutron-detecting scintillator is remotely positioned from the electronics component or 2) a useless radiation-type level detection gauge in which dangerous neutron

emitting fissile material would have to be substituted for the gamma radiation source 4 shown in Hurst et al.

In any event, even though nothing in the prior art suggests forcing together such a combination, the resultant combined structure would be either dysfunctional or useless for either of the purposes disclosed in the prior art references. Accordingly, Claim 6 is patentably distinct over the prior art.

Claims 10 and 11

Claims 10 and 11 stand rejected under 35 U.S.C. §103(a) as being obvious over Murray et al. and Hurst et al. in view of Majewski et al. This rejection is respectfully traversed.

Majewski et al. discloses that, in a laboratory setting, small samples (one cm^3) of the liquids being tested were poured into small quartz cuvettes (which are inherently non-flexible) "which were then wrapped with Teflon tape (except their bottom windows) to optimize light collection." Although Majewski et al. makes no mention of the light reflective qualities of Teflon tape, it does not include any suggestion to situate a light reflector (whether a flexible sheet, as specified in Claim 11, or otherwise) around a liquid-filled scintillation chamber within a protective sheath as part of a flexible scintillator used as a level sensing gauge that may or may not be remotely spaced from the electronic components thereof by an optical fiber or liquid filled light pipe.

Again, the prior art does not suggest making such a combination and, if done, the resulting structure would require hindsight modifications prompted only by the present specification. Accordingly, Claims 10 and 11 are patentably distinct over the prior art.

Claim 12

Claim 12 is rejected under 35 U.S.C. §103(a) as being obvious over the combination of Murray et al. and Hurst et al. in view of Rozsa (U.S. 6,407,390). This rejection is respectfully traversed.

Rozsa discloses circuitry for compensating for the temperature-induced performance shift of a sodium iodide (NaI) scintillation crystal and a photomultiplier tube in industrial settings. While the Rozsa invention may very well be applicable to a structure like that shown in Hurst et al., there is no suggestion that it would be similarly applicable to the structure disclosed in Murray et al. Moreover, nothing in Rozsa overcomes the lack of motivation in the prior art to combine any parts of Hurst et al. with any parts of Murray et al. nor does it overcome the functional flaws that would be found in such a combination. Accordingly, Claim12 is patentably distinct over the prior art.

Claim 13

Claim 13 stands rejected under 35 U.S.C. §103(a) as being obvious over the combination of Murray et al. and Hurst et al. in view of McDermott (U.S. 5,457,877). This rejection is respectfully traversed.

McDermott shows an apparatus and method for cutting through cable sheathings without damaging the wires or optical fibers it encloses. The Examiner acknowledges that the protective sheath disclosed in Hurst et al. to cover optical fibers used as a light pipe is not disclosed to be armored to resist crushing forces. To the extent that armor protected sheaths are known in the

art, particularly for protecting cables, there is nothing to suggest providing an armored protective sheath around a liquid-filled scintillator used as a level sensing gauge.[1]

McDermott adds nothing to supply a motivation to combine Murray et al. and Hurst et al. Likewise, it does not teach a modification to overcome the functional flaws of such a combination. Accordingly, Claim 13 is patentably distinct of the prior art.

Conclusion

The prior art does not suggest the use of a liquid filled scintillator within a flexible protective sheath joined with photodetection circuitry for use as a level sensing gauge. It is well know that using a neutron emitter as a source of radiation for a level sensing gauge is not feasible. Therefore, a person of ordinary skill in the art would not be motivated to use the liquid filled scintillator of Murray et al. as such. None of the other prior art of record suggest the extensive modifications and substitutions that would be required to meet the terms of the claims.

Favorable reconsideration and prompt allowance of all the claims are respectfully requested.

Respectfully submitted,
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[1] The Applicants note the Examiner's repeated reference to the use of a "scintillating fiber optic detector." Neither the presently-claimed invention nor any of the cited prior art relates to the use of scintillating fiber optics as a detector.

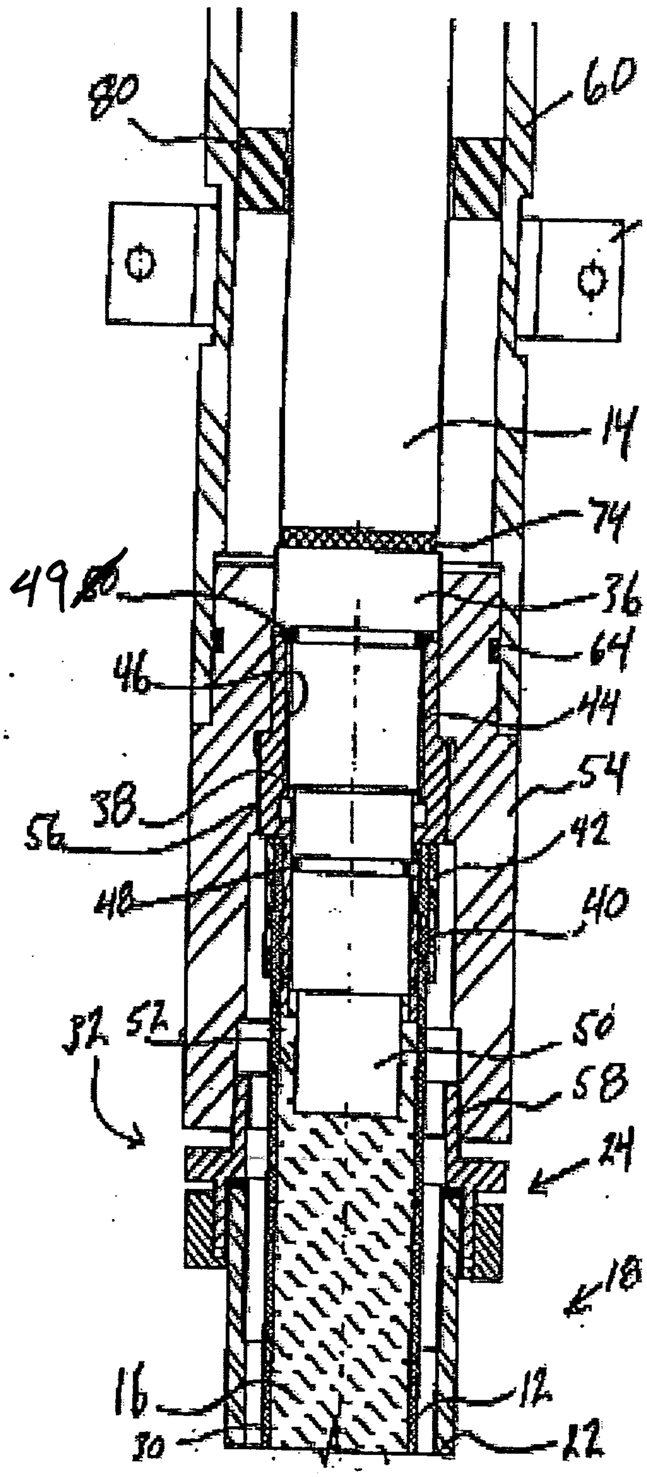

Fig. 3

ANNOTATED MARKED-UP DRAWINGS

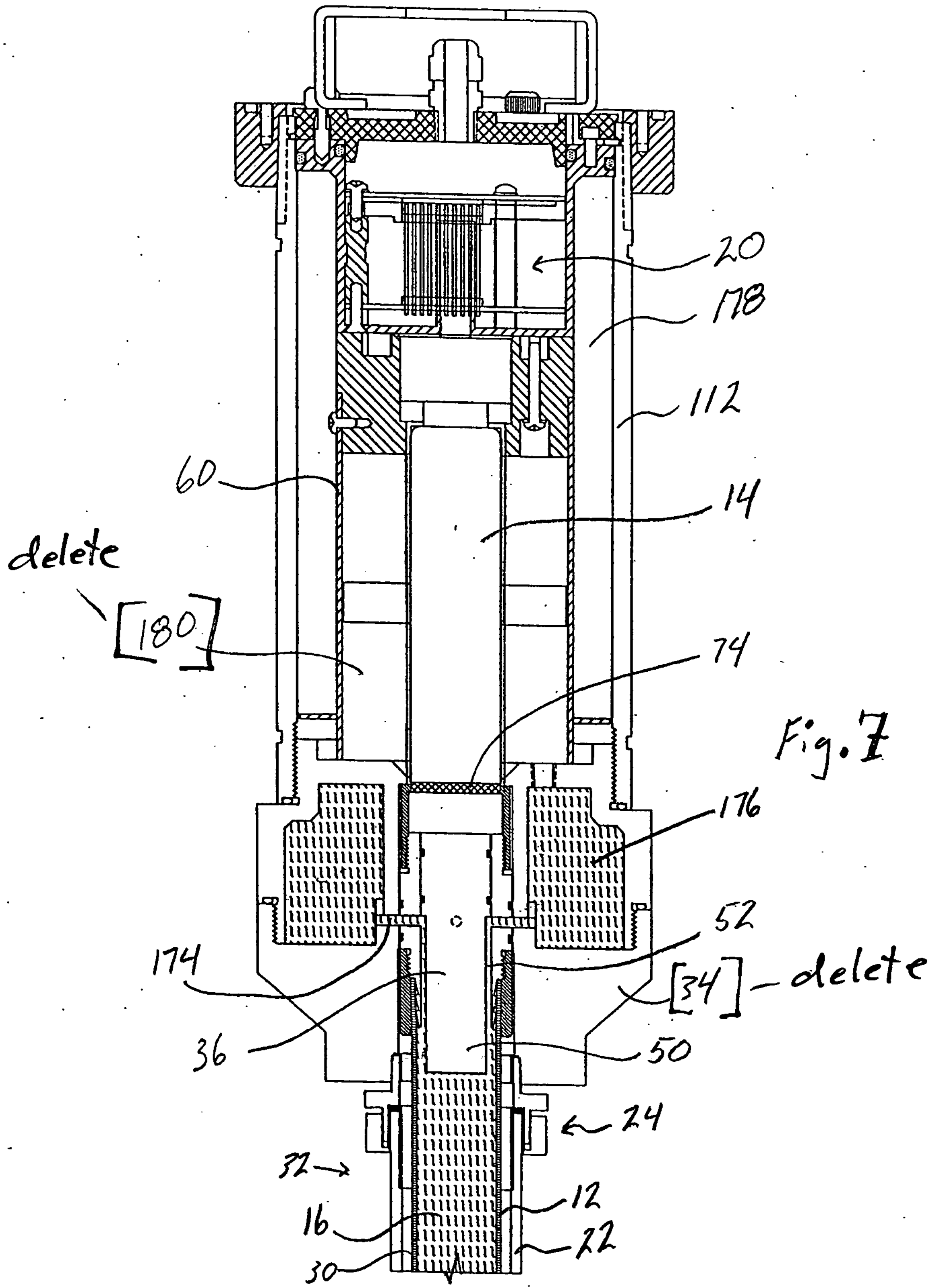

Fig. 7

ANNOTATED MARKED-UP DRAWINGS